



WASTE CONTROL SPECIALISTS

**Generator Handbook for Elemental
Mercury Storage at WCS**

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Generator Handbook for Elemental Mercury Storage at WCS

1. PREFACE

This handbook provides generator-facing guidance for the characterization, containerization, documentation, profiling, and shipment of elemental mercury offered to Waste Control Specialists LLC (WCS) for storage. It is intended to support implementation of WCS-specific waste acceptance and submittal expectations in a manner consistent with applicable regulatory requirements and the U.S. Department of Energy (DOE) *Interim Guidance on Packaging, Transportation, Receipt, Management, Short-Term and Long-Term Storage of Elemental Mercury*, dated September 2023. The September 2023 DOE interim guidance combines, updates, supersedes, and rescinds DOE's prior *U.S. Department of Energy Interim Guidance on Packaging, Receipt, Management, and Long-Term Storage of Elemental Mercury* (November 2009) and *Guidance for Short-Term Storage of Elemental Mercury by Ore Processors* (May 2019). It also reflects applicable statutory provisions of the Mercury Export Ban Act of 2008 and the Frank R. Lautenberg Chemical Safety for the 21st Century Act, including provisions related to long-term storage and interim onsite storage by qualifying ore processors. Elemental mercury offered to WCS for storage must be generated in the United States, meet DOE's interpretation of "elemental mercury" for acceptance at a Long-Term Elemental Mercury Storage Facility, and comply with applicable Resource Conservation and Recovery Act (RCRA), U.S. Department of Transportation (DOT), DOE, State of Texas, WCS permit, and WCS Waste Acceptance Criteria requirements. This handbook does not replace or modify any applicable statute, regulation, permit condition, DOE requirement, or WCS Waste Acceptance Criteria; in the event of a conflict, those controlling requirements govern.

2. Prerequisites

Prior to offering elemental mercury to WCS for storage, the generator shall have all required agreements, approvals, and authorizations in place with DOE and WCS, as applicable. The generator is responsible for ensuring that the elemental mercury is eligible for storage, properly characterized, appropriately containerized, and supported by complete documentation before submittal of a WCS Waste Profile or Request for Storage.

DOE's September 2023 interim guidance does not carry forward the prior assumption from the 2009 long-term storage guidance that elemental mercury accepted for storage at a DOE-designated Long-Term Elemental Mercury Storage Facility must be at least 99.5 percent by volume elemental mercury. Instead, the September 2023 DOE interim guidance focuses on whether the material meets DOE's interpretation of "elemental mercury," complies with applicable RCRA and DOT requirements, is compatible with the storage container, and is free of prohibited secondary phases, corrosion agents, and discernible radiological contamination.

For purposes of determining eligibility for storage, MEBA requires DOE to store "elemental mercury" at a Long-Term Elemental Mercury Storage Facility. DOE interprets that term, as described in the September 2023 DOE interim guidance, to mean elemental mercury that was generated in the United States and meets one or more of the following criteria:

- U151 coded waste;
- Elemental mercury generated from the treatment of D009 coded waste using RMERC treatment technology; and/or
- Mercury that was previously treated to 99.5 percent by volume elemental mercury.

The generator shall characterize all elemental mercury offered to WCS for storage and shall provide sufficient documentation to demonstrate that the material meets DOE eligibility

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expectations, WCS Waste Acceptance Criteria (WAC), and applicable regulatory requirements. Documentation shall address, as applicable, waste codes, generation source, treatment history, container contents, container compatibility, absence of prohibited secondary phases or corrosion agents, absence of discernible radiological contamination, and the volume and weight of each container.

All elemental mercury submitted for storage shall meet the WCS WAC and shall be containerized, packaged, marked, labeled, and characterized in accordance with this handbook and applicable DOT, RCRA, DOE, permit, and regulatory requirements. A Request for Storage shall be prepared by the generator and submitted with each shipment, together with all required supporting documentation.

3. Elemental Mercury Characterization

All elemental mercury stored at WCS shall be elemental mercury that was generated in the U.S. and meets one (or more) of the following criteria:

- U151 coded waste,
- Elemental mercury generated from the treatment of D009 coded waste using the RMERC treatment technology, and/or
- Mercury that was previously treated to 99.5 vol% elemental mercury. The generator shall characterize all elemental mercury offered to WCS for storage to determine if there are any contaminants present.

3.1. Individual Container Validation

Individual containers of elemental mercury may be validated by acceptable knowledge, process knowledge, visual examination, radiological screening or conducting laboratory analyses satisfying the waste characterization requirements of the WCS WAC. Laboratory analysis if conducted shall be completed by an independent, third-party laboratory, and submitted with the WCS Waste Profile & RFS.

3.2. Characterization Methods

Laboratory Certified Analysis - Laboratory certified analysis can be used to establish contaminant content and contaminant names.

Radioactivity Process Knowledge - While discernible radioactivity above naturally occurring background levels is not expected to be present in elemental mercury; all elemental mercury received for storage shall be appropriately characterized for radioactivity. When the origin and constituents of a waste stream are well known and properly documented, the generator may use process knowledge (PK) to characterize the radioactivity properties of the elemental mercury.

Examples of PK which may be used to characterize the radioactivity of elemental mercury are as follows:

- All originating materials and subsequent processing steps are known and documented. If elemental mercury was recovered from mercury-bearing products or equipment, the

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documentation shall demonstrate that the recovered elemental mercury—not the product, equipment, or environmental media itself—is the waste form being offered for storage and that no discernible radiological contamination was introduced;

- Sampling and analysis results for the process, as provided in Section 2.1;
- Analytical results from similar processes;
- Administrative/procedural controls; and
- Safety Data Sheets

If Process Knowledge is not a valid means of ensuring that the elemental mercury is not radioactively contaminated, EPA has developed procedures for determining the presence of alpha, beta, and gamma radiation

- EPA Hazardous Waste SW-846, Test Method 9310: Gross Alpha and Gross Beta Evaluation of Solid Waste (used for alpha and beta radiation detection)
- EPA 402-R-12-006: Radiological Laboratory Sample Analysis Guide for Incident Response (used for alpha, beta, and/or gamma radiation detection)

Alternative Characterization Methods

A generator may submit a request for an alternative characterization method for consideration by WCS. The generator shall demonstrate the equivalency of the alternate method for determining the contaminant content and name, or the presence of radioactivity (e.g., other quantitative technique). WCS may approve or disapprove of any requested alternative characterization methods, at their discretion.

3.3. Characterization Documentation

Documentation of the waste characterization shall be submitted as attachments to, and values placed on, the WCS Waste Profile. The documentation shall include at least the following:

1. Physical and chemical characteristics;
2. Applicable RCRA waste codes;
3. Container contents and contaminant identity/concentration, as applicable;
4. Documentation supporting absence of prohibited secondary phases, corrosion agents, and discernable radiological contamination;
5. Weight of empty container (tare weight), weight of content (waste), and gross weight (weight of container and content);
6. Characterization date;
7. Generating source and treatment history, if applicable;
8. Container Type, size, material of construction, and estimated gross weight;
9. Any other information which may be needed to store the elemental mercury;

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10. Certification attesting the truthfulness and accuracy of the submitted information.

3.4. Prohibited Material

Contaminants cannot be any of the listed Prohibited Materials at discernible levels, including all the following:

1. Discernible radiological contamination;
2. RCRA hazardous waste codes other than D009 and/or U151, unless specifically reviewed and approved by WCS and allowed under the WCS WAC;
3. Insufficient documented knowledge of the waste origin, generation process, treatment history, or container contents;
4. Water, chloride salt solutions, acid solutions, visible mercury salts, or other secondary phases or corrosion agents that may compromise container integrity or compatibility.

4. Storage Container Requirements

The generator is responsible for containerizing elemental mercury in containers that are DOT compliant, RCRA compliant, compatible with the container contents, and approved by WCS prior to shipment. All containers and waste packaging sent to WCS shall comply with applicable DOT, RCRA, WCS WAC, permit, and any other applicable regulatory requirements.

4.1. Acceptable Container Types:

1. 3-L containers, with a nominal volume capacity of 3 liters and approximately 35 kg capacity;
2. 1-MT containers, with a nominal volume capacity of approximately 88 liters and approximately 1,000 kg/1 metric ton capacity;
3. Other container types or materials, including stainless steel or plastic containers not subject to corrosion, may be considered by WCS on a case-by-case basis, provided they meet applicable DOT, RCRA, WCS WAC, compatibility, and handling requirements.

4.2. Carbon Steel Container Requirements:

For carbon steel containers, unless otherwise approved by WCS in writing, the container shall meet the following requirements

1. Constructed of carbon steel meeting the specifications of American Society for Testing and Materials International (ASTM) A36, or other steel alloys equal or better in strength and corrosion resistance.
2. Outer surface of all metal containers shall be coated with a corrosion resistant material, (e.g., epoxy, alkyd enamel, direct-to-metal coating, etc.), in a light color.
3. Inner surface and port threads shall not be coated.
4. Container shall be capable of being self-supported in the upright position on a flat level surface, such that the plug is at the highest elevation and not in routine contact with the liquid within.
5. The outside of each container shall be free of surface contamination and not exhibit any visible signs of corrosion or degradation.

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Alternate container materials shall be demonstrated to meet applicable DOT and RCRA requirements and to be compatible with the elemental mercury and any allowable constituents.

4.3. Container Plug and Sealing

For threaded metal containers, plugs and closures shall be compatible with the container material and contents and shall comply with applicable manufacturer specifications, DOT requirements, and WCS acceptance criteria.

All carbon steel container plugs shall be constructed of a steel alloy that is compatible with the container construction material and shall comply with the applicable ASTM specifications (e.g., ASTM A105 for forged fittings, ASTM A197 for cast fittings, etc.).

1. 1-MT containers shall use either a 2- or 3-inch National Pipe Thread (NPT) plug with a square head.
2. 3-L containers shall use a 1/2-inch NPT plug, with a 3/16-inch diameter hole drilled through the head of the plug, perpendicular to the axis of the plug. The hole shall be positioned with enough material around it to safely lift the container full of elemental mercury.
3. Container plugs shall be sealed with polytetrafluorethylene (Teflon™) tape or equivalent.
4. Only sealed containers shall be accepted by WCS. Containers shall be sealed and torqued in accordance with the container manufacturer's instructions. Where required by WCS, containers shall be documented as capable of withstanding internal pressure consistent with applicable DOT requirements, manufacturer specifications, and WCS acceptance criteria.
5. Containers also shall be kept closed except when filling, emptying, or sampling a container.

4.4. Tamper-Indicating Devices (TID)

Generators shall ensure that containers are protected against unauthorized entry.

1. TIDs are placed on each container in such a position that the container cannot open without breaking the seal.
2. Each TID has a unique identification number traceable to that individual container and that is recorded on the Shipping Papers, additional descriptions block.

4.5. Container Filling Requirements

Containers shall be filled in compliance with applicable DOT filling limits and shall include sufficient headspace to allow for thermal expansion under conditions normally incident to transportation. A nominal 10–15% headspace is preferred; other DOT-compliant fill configurations may be accepted by WCS on a case-by-case basis.

The maximum depth of the elemental mercury within the container from the top of the container opening to the bottom surface inside the container shall be <0.7 meters, to allow for vacuum extraction.

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4.6. Documentation of Waste Package Contents

For each waste package, the generator shall maintain and submit a detailed record of the container contents, volume, tare weight, net weight, gross weight, container identification number, TID number, and corresponding Waste Profile/RFS container number. This information shall be consistent with the shipping papers and supporting characterization documentation.

4.7. Use of Pallets

If pallets are used to transport elemental mercury for storage at WCS, the pallet type, material of construction, load rating, and configuration shall be approved by WCS prior to shipment. Pallets shall be capable of supporting full containers without distortion, constructed of noncombustible and non-porous material or otherwise acceptable to WCS, and designed to allow safe handling.

4.8. Marking and Labeling

The generator shall label and mark all containers consistent with information on the WCS Waste Profile. All labels and markings shall be legible and shall comply with DOT and RCRA requirements for hazardous wastes and materials. All waste containers shall have the following labels and markings listed below affixed to the container:

1. Waste container label;
2. Generator Name & address;
3. Hazardous waste accumulation start date required by RCRA; and
4. Appropriate DOT PSN, Waste Class, & RCRA Waste Codes - markings & labels;
5. Unique WCS Profile number and RFS container number
6. Shipping Paper Line-Item Number

4.9. Marking & Labeling Placement

1. 3-L containers marked on the shoulder;
2. 1-MT containers marked on the top near the plug and on the side;
3. Preferred orientation perpendicular to the C-channels.

5. Waste Profiles and Shipping Requests with WCS

WCS uses the ELITE customer portal for generator account access, Waste Profile submittals, supporting documentation, and shipment request submittals. WCS will provide customer-specific training or guidance, as needed, for use of ELITE.

5.1. ELITE Registration and Access

Request an account at: <https://elite-customer.wcstexas.com/login>

1. Choose "Request Account"
2. Complete Account Request Step 1: User Information
3. Complete Account Request Step 2: Company Name
4. Complete the security step as applicable and click "Request an Account" to submit the request.

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5.2. Waste Profile Submittal

WCS will train customers on the use of our online Waste Profile software program called ELITE. Customers will submit a Waste Profile using the data collected in the steps above.

1. Once access is approved, begin to profile waste;
 - a. Attach Characterization Documentation to the WCS On-line Waste Profile in ELITE.
 - b. Attach Container and/or Process Validation Documentation to WCS Online Waste Profile in ELITE.
 - c. Attach Request for Storage, required by DOE for the Storage of Elemental Mercury, to the WCS On-line Waste Profile in ELITE.

5.3. Shipment Request Submittal

Once the submitted waste profile is approved the generator will submit a Shipment Request through the same WCS ELITE On-line program (WCS shall provide individual training for this section);

1. The generator will complete the Shipment Request Process and attach copies of the Uniform Hazardous Waste Manifest as well as any other documentation needed to complete a US DOT compliant shipment of mercury waste for storage to WCS.
2. Once the shipment is approved the generator will receive an email notification with authorization to ship.

6. Guidance Throughout the Process

WCS Technical Services will provide guidance during the profiling, documentation, shipment request, and authorization process. Generators should coordinate questions regarding eligibility, characterization, container requirements, ELITE submittals, or shipment scheduling with their WCS Technical Services Project Manager (TSPM).

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